

## Principles of Heredity Revision

Name: \_\_\_\_\_

Part A: Circle the letter of the term or phrase which correctly completes the statement

- Which of the following describes the differences in bases present on DNA and RNA:  
A. A replaces G B. U replaces T C. M replaces C D. N replaces A
- A dominant trait or characteristic is one that:  
A. Skips a generation C. Prevents another trait from showing  
B. Is hidden C. Is only in females
- The number of chromosomes in a human male sperm cell is:  
A. 20 B. 46 C. 13 D. 23
- Two X chromosomes are found in cells of all:  
A. Human males B. Human females C. Fruit flies D. Living things
- A hybrid or heterozygous organism can be defined as an organism having:  
A. Two recessive genes C. Two dominant genes  
B. A dominant and a recessive gene D. Three recessive genes
- The formation of sex cells (sperm and ova) is called:  
A. Mitosis B. Breeding C. A Punnett square D. Meiosis
- In a cross between a pure (homozygous) and a hybrid (heterozygous) yellow-seeded pea plant (i.e. YY with Yy), the percentage of offspring showing the dominant trait or characteristic will be:  
A. 100% B. 0% C. 25% D. 75%
- Human males produce sperm cells with the chromosomes:  
A. X only B. Y only C. XX D. X or Y
- The passing of traits from parents to offspring is called:  
A. Blending B. Mutation C. Heredity D. Vigour
- Which of the following is NOT a characteristic of DNA:  
A. It has a helical (spiral) shape C. It is found in the cell walls of all cells  
B. It contains sugar, phosphate and bases D. It codes for inherited traits and proteins
- The term selective breeding refers to:  
A. Organisms whose genes have been changed artificially  
B. Removing some DNA or genes from an individual, changing it, and putting it back in the same person.  
C. A 'map' of all the genetic material in humans  
D. Purposely breeding organisms that have favourable traits
- The percentage of offspring with the dominant trait if both parents are pure (homozygous) recessive is:  
A. 0% B. 25% C. 50% D. 100%
- Which of the following statements about autosomal cells is NOT true:  
A. The chromosome number is haploid  
B. The nucleus contains 46 chromosomes  
C. They reproduce by mitosis  
D. Cell reproduction produces identical cells

### Part B

Use the word homozygous/pure or heterozygous/hybrid to identify each of the following genotypes.

1. HH: \_\_\_\_\_ 2. hh: \_\_\_\_\_ 3. Hh: \_\_\_\_\_

Use the code R for recessive and D for dominant to identify which trait will be shown in individuals with the following phenotypes:

4. GG: \_\_\_\_\_ 5. gg: \_\_\_\_\_ 6. G\_: \_\_\_\_\_ 7. Gg: \_\_\_\_\_

A black guinea pig is mated with a black guinea pig. Fifteen black and five white offspring are produced.

8. Were the parent guinea pigs homozygous or heterozygous? \_\_\_\_\_

9. Were the white offspring homozygous or heterozygous? \_\_\_\_\_

10. How many of the offspring were probably hybrid? \_\_\_\_\_

A black guinea pig is mated with a white guinea pig. All offspring (42) were black.

11. Which trait is dominant, black or white? \_\_\_\_\_

12. Which trait is recessive, black or white? \_\_\_\_\_

13. Are the offspring homozygous or heterozygous? \_\_\_\_\_

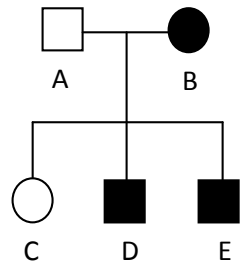
14. Was the black parent homozygous or heterozygous? \_\_\_\_\_

#### Part C

The pedigree shown is for albinism. Shaded symbols represent persons who are albinos.

Circle the correct underlined word or phrase to complete each statement.

1. Person A is male/female
2. Person A is normal/albino
3. Person B is male/female
4. Person B is normal/albino
5. Persons C and D are children/parents of person A and B
6. Person A has a genotype NN/Nn/nn
7. Person B has a genotype NN/Nn/nn
8. Person C has a genotype NN/Nn/nn
9. Person D has a genotype NN/Nn/nn



#### Part D

1. Let the allele for tallness in pea plants be represented by T and the allele for shortness be represented by t. Using Punnett squares, solve the following problems:

- a. If you cross a Tt plant with a tt plant, what are the probable offspring? Complete the Punnett square and write the number of appropriate offspring in the blanks to the left.

No. of tall plants produced: \_\_\_\_\_  
No. of short plants produced: \_\_\_\_\_  
No. of homozygous tall produced: \_\_\_\_\_  
No. of heterozygous tall produced: \_\_\_\_\_  
No. of homozygous short produced: \_\_\_\_\_

	T	t
t		
t		

- b. If you cross a TT plant with a Tt plant, what are the probable offspring?

No. of tall plants produced: \_\_\_\_\_  
No. of short plants produced: \_\_\_\_\_  
No. of homozygous tall produced: \_\_\_\_\_  
No. of heterozygous tall produced: \_\_\_\_\_  
No. of homozygous short produced: \_\_\_\_\_

	T	T
T		
t		

2a. Explain the process of therapeutic cloning: \_\_\_\_\_

2b. Provide the results of the human genome project: \_\_\_\_\_

**Answers:** Part A: 1B, 2C, 3D, 4B, 5B, 6D, 7A, 8D, 9C, 10C, 11D, 12A, 13A. Part B: 1. Homozygous 2. Homozygous 3. Heterozygous 4. Dominant 5. Recessive 6. Dominant 7. Dominant 8. Heterozygous 9. Homozygous 10. Half 11. Black 12. White 13. Heterozygous 14. Homozygous Part C: 1. Male 2. Normal 3. Female 4. Albino 5. Children 6. Nn 7. nn 8. Nn 9. nn Part D: 1a. 2, 2, 0, 2, 2 1b. 4, 0, 2, 2, 0 2a. Take DNA from healthy cell & transfer to egg -> allow 5 days to grow into blastocyst -> collect stem cells in growth media -> transplant 2b. All people have 99% same DNA, 6% useful DNA, 32000 genes coding for approx. 26000 proteins of which not all functions are known yet!